

REMARKS

Entry of the foregoing is appropriate pursuant to 37 C.F.R. §1.116(b)(1) in that the amendment is made to have the specification and drawings comply the with requirements for form, and the amendment does not modify the claims.

Reexamination and reconsideration of the subject application are respectfully requested in light of the amendments and the comments which follow.

DRAWINGS

Figure 1 is objected to in paragraph 3 of the Official Action for lacking the label "PRIOR ART." Applicants submit herewith a replacement sheet for Figure 1 having the required label.

OBJECTIONS TO THE SPECIFICATION

The specification is objected to in paragraph 4 of the Official Action for not following the guidelines for the preferred layout thereof, and for the lacking a heading for the brief description of the drawings. By the present response, Applicants have amended the specification to overcome the objections.

CLAIM REJECTIONS UNDER 35 U.S.C. § 103

Claims 1, 5, and 10 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Dearnaley et al., WO 99/131128 (hereafter "*Dearnaley*") in view of Doyon et al., U.S. Patent No. 5,558,948 (hereafter "*Doyon*") on the grounds set forth in paragraph 6 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

The present invention is directed to a fuel cell having an improved electrode construction. Conventional electrode structures suffer from poor diffusion of reaction products away from the electrode surface, among other deficiencies. The electrode structures of the present invention promote and facilitate the release of oxidation products, such as gaseous products, from an electrocatalyst on the surface of the electrode, thereby improving mass transport in reducing electrode polarization or over potential. Additional benefits derived from the present invention include more versatile cell design based on thin, lightweight components, as well as a construction that allows low fuel concentrations to be used. A fuel cell constructed according to the principles of the present invention is set forth in amended claim 1. Amended claim 1 recites:

A fuel cell having an anode, a cathode and an electrolyte which is an ion exchange membrane, wherein the anode and cathode are immediately adjacent the electrolyte and wherein the anode comprises a wire mesh support of conductive material comprising strands defining pores and channels therebetween, and an electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered.

The References as Applied Fail to Disclose All of the Elements of the Claims

It is respectfully submitted that the references as applied do not disclose or suggest a fuel cell anode comprising as mesh having an "electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered" as recited in claim 1, the sole independent claim.

"It is elementary that to support an obviousness rejection, all of the claim limitations must be taught or suggested by the prior art applied and that all words in a claim must be considered in judging the patentability of that claim against the prior art." *Ex Parte Burgess*, Appeal 2008-2820, slip op. at 6 (BPAI, Feb. 9, 2009) (citing

In re Royka, 490 F.2d 981, 984-85 (CCPA 1974) and *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970)).

It is respectfully submitted that the rejection incorrectly contends that it "is inherent that a catalyst deposited onto a mesh support by vacuum deposition would only have catalyst on the strands while leaving the pores and channels substantially uncovered." Office Action dated October 6, 2009, page 5, paragraph 6. The rejection lacks an adequate explanation of why the missing element is inherent and cites no evidentiary support for this contention. The fact that a certain result or characteristic may occur or be present in the prior art is not sufficient to establish the inherency of that result or characteristic. *In re Rijckaert*, 9 F.3d 1531, 1534, 28 USPQ2d 1955, 1957 (Fed. Cir. 1993). Inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient. *In re Robertson*, 169 F.3d 743, 745, 49 USPQ2d 1949, 1950-51 (Fed. Cir. 1999) (citations omitted).

In fact, the record indicate that the opposite is true, in that vacuum deposition onto a web or mesh support frequently results in the closure of openings therein. In particular, *Dearnaley* discloses the use of vacuum deposition to form "barriers coatings for food packaging" and "optical thin films" by deposition of materials with a "web coating process." *Dearnaley* at 5, lines 8-17. In other words, *Dearnaley* states that vacuum deposition can close up the openings in a web to form a continuous sealed barrier or film.

For the above reasons, it is respectfully submitted that the rejection fails to establish, either explicitly or inherently, that the claim limitation of an "electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered"

can be found in the prior art. Reconsideration and withdrawal of the rejection is requested.

Insufficient Rationale Exists to Combine the References as Proposed in the Rejection

To reject a claim based on obviousness, Office personnel must resolve the Graham factual inquiries and then articulate the following:

(1) a finding that the prior art contained a device (method, product, etc.) which differed from the claimed device by the substitution of some components (step, element, etc.) with other components;

(2) a finding that the substituted components and their functions were known in the art;

(3) a finding that one of ordinary skill in the art could have substituted one known element for another, and the results of the substitution would have been predictable; and

(4) whatever additional findings based on the Graham factual inquiries may be necessary, in view of the facts of the case under consideration, to explain a conclusion of obviousness. MPEP 2143.B.

In this case, the rejection fails to satisfy factual inquiries (2) and (3) of the rationale. As noted above, the rejection is inadequate to establish factual inquiry (2), more specifically that a mesh with an "electrocatalyst layer only on the strands leaving the pores and channels substantially uncovered" was known in the art. Furthermore, as detailed below, there is no factual support for any finding of (3) that one of ordinary skill in the art could have substituted the catalyst support member of *Doyon* for the electrode of *Dearnaley* and would have predicted success in doing so.

Doyon discloses a continuous electrode wherein a nickel alloy continuous member is sintered to a porous member, such as a mesh. *Doyon*, Figure 1, and col. 1, lines 16-21. There is no suggestion that the mesh might be left open or that it might serve as an electrode by itself. The mesh acts merely as a support for the

nickel alloy member and serves to allow for better joining of the two layers. *Id.*, col. 4, lines 10-15.

Furthermore, the anodes of *Doyon* are intended for use in "molten carbonate fuel cells." *Id.*, col. 1, lines 7-8. This is completely different from the gaseous fuel source of *Dearnaley*. *Dearnaley* at 11, lines 14-15.

It is respectfully submitted that the rejection fails to supply adequate reasoning as to why one of ordinary skill in the art would combine the various elements of the prior art as proposed, and further that insufficient supports exists for the contention that one of ordinary skill in the art would expect predictable results in the proposed substitution.

Without a reasoned, fact-based explanation supported by the evidence of record, an obviousness rejection cannot stand. *Ex Parte Whalen*, Appeal No. 2007-4423, slip op. at 8 (BPAI, July 23, 2008). Applicants respectfully maintain that the obviousness rejection fails to meet the legally-required findings of fact.

Claims 6 and 7 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Dearnaley* in view of *Doyon* on the grounds set forth in paragraph 7 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Claims 6 and 7 depend from claim 1. Thus, these claims are also distinguishable over *Dearnaley* in view of *Doyon* for at least the same reasons noted above.

Claims 8 and 9 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Dearnaley* in view of *Doyon* on the grounds set forth in paragraph 8 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Claims 8 and 9 depend from claim 1. Thus, these claims are also distinguishable over *Dearnaley* in view of *Doyon* for at least the same reasons noted above.

Claims 8 and 9 also stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Dearnaley* in view of *Doyon* and further in view of U.S. Patent No. 3,835,514 to Pollack (hereafter "*Pollack*") on the grounds set forth in paragraph 9 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

It is alleged in paragraph 9 of the Official Action that *Pollack* teaches a plurality of laminated metallic fibrous sheets, in layers of parallel arrays of fibers running at an orientation angle between 30° and 90° from the longitudinal direction thereof. However, even if the alleged teachings of *Pollack* were applied to *Hamada et al.* exactly as suggested in the grounds for rejection, the claimed invention would not result. Namely, the alleged teachings of *Pollack* fail to cure the deficiencies previously noted above in connection with the teachings of *Hamada et al.* with respect to the requirements of claim 1. Therefore, reconsideration and withdrawal of the rejection is respectfully requested.

Claims 11 and 12 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over *Dearnaley* in view of *Doyon* and further in view of U.S. Patent Application Publication No. 2002/0150812 to Kaz et al. (hereafter "*Kaz et al.*") on the grounds set forth in paragraph 10 of the Official Action. For at least the reasons noted below, this rejection should be withdrawn.

Kaz is relied upon for disclosure of a mesh of titanium or titanium alloy or at least one intermediate layer between the electrocatalyst and the mesh. It is respectfully submitted that *Kaz* fails to cure the above-noted deficiencies of *Dearnaley* and *Doyon*, so that claims 11 and 12 are patentable for the reasons described above as claims depending from claim 1.

CONCLUSION

From the foregoing, further and favorable action in the form of a Notice of Allowance is earnestly solicited. Should the Examiner feel that any issues remain, it is requested that the undersigned be contacted so that any such issues may be adequately addressed and prosecution of the instant application expedited.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

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